CLAIMS

What is claimed is:

Sub a1

1. An input device for providing a signal to effect translational and/or rotational movements of an object on a graphical display, comprising:

a device for capturing video images;

an input image processor that translates captured video images of human arm motion into signals that are delivered to an output image processor, the input image processor programmed to (a) isolate the human form from the background in the captured video image; (b) determine the position and movement of the human arms; and (c) generate an output signal responsive to the position and/or movement of the human arms; and

an output image processor that is programmed to effect translational and/or rotational movement of an object on a graphical display in response to the signals received from the input image processor.

2. The input device of claim 1 wherein the output image processor changes the graphical display according to the perspective of what a flying object would see.

3. The input device of claim 1 wherein the output image processor generates a graphical display of a flying object whose position and motion are responsive to the signal output by the input image processor.

Sub a2

4. A method for generating signals to effect translational and/or rotational movements of an object on a graphical display using human arm position and movement data, comprising:

providing an image processor and a device for capturing video images;

capturing video images and processing those images to isolate a human form from a background;

isolating the arm portions of the human form;

calculating the arm position and movement data; and

generating a signal responsive to the arm position and movement data for effecting translational and/or rotational movement of an object on a graphical display.

5. A method for generating signals using human arm position and/or movement data, comprising:

providing an image processor and a device for capturing video images;

capturing video images with the device and using the image processor to process those images to isolate a human form from a background;

isolating the arm portions of the human form from a captured video image using the image processor;

calculating the arm position and movement data using the image processor; and

generating a signal responsive to the arm position and movement data using the image processor.

6. A method for generating signals to effect translational and/or rotational movements of an object on a graphical display using human arm position and/or movement data, comprising:

providing an image processor and a device for capturing a video sequence;

capturing, from the video sequence, a frame that does not include a person;

isolating a view comprising a foreground subject image view by performing an algorithm on the video sequence and the frame that does not include the person;

determining whether the isolated view includes the image of a person;

determining the horizontal extent of the subject's torso so as to isolate the arm portions of the human form in each captured video frame;

computing the arm angles by calculating angles of principle moment of the nonzero pixels in the arm portions of the video image; and

generating an arm position data signal responsive to arm angles for effecting the translational and/or rotational movement of an object on a graphical display.

7. The method of claim 6 wherein the step of determining whether the view includes a person comprises the steps of:

counting the total number of nonzero pixels in the foreground image;

ensuring that the total number of nonzero pixels falls within a range defined by a minimum and a maximum threshold number of pixels.

8. The method of claim 6 wherein the algorithm in the isolating step involves subtracting the frame that does not include a person from the individual frames in the video sequence.

9. The method of claim 6 wherein the following algorithm is used in the isolating step:

(a) obtain static background Y0 U0 V0 frames;
(b) smooth images Y0 U0 V0 using a 5x5 Gaussian convolution;
(c) obtain current Y U V video frames;
(d) smooth images Y U V using a 5x5 Gaussian convolution;
(e) for each pixel in Y, compute Ydif = abs( Y – Y0);
(f) for each pixel in U, compute Udif = abs( U – U0);
(g) for each pixel in V, compute Vdif = abs( V – V0);
(h) for each pixel in Ydif Udif Vdif, compute Sum = Ydif + Udif*8 + Vdif*8;
(i) for each pixel in Sum, compute Foreground = 1 if Sum > Threshold, 0 otherwise;
(j) erode Foreground using standard erosion morphological filter (to remove any single-pixel erroneous measurements, such as caused by salt-and-pepper noise).

Sub A3

10. ~~The method of claim 6~~ wherein the arm position/movement data signals generated in the generating step are selected from the group consisting of signals related to object airspeed acceleration, bank angle, and pitch angle.

11. The method of claims 6 wherein the arm position/movement data signals generated in the generating step are determined with the inclusion of smoothing constants.

12. A method for generating signals for use in a flight simulator graphical display using human arm position data to effect translational and/or rotational movement, comprising:

providing a device for capturing video images and an image processor;

capturing video images with the device and using the image processor to process those images to isolate a human form from a background;

isolating the arm portions of the human form from a captured video image using the image processor;

calculating arm position and movement data using the image processor; and

generating a signal responsive to the arm position and movement data using the image processor for use in generating the state of a flight simulator graphical display.

13. The method of claim 12 wherein the flight simulator graphical display includes as an object a flying creature that moves wings.

14. The method of claim 12 wherein the flight simulator graphical display depicts a change in perspective of what a flying creature would see.

15. ~~The method of claim 13 further including the step of generating flapping noises~~ corresponding to the movement of the wings of the flying creature.

16. The method of claim 15 wherein the volume of the flapping noises increases with an increased rate of captured arm motion.

17. The method of claims 15 wherein the flapping noise is triggered when the signed ~~time rate of change of the average of the arm angles exceeds a~~ pre-determined threshold.

18. An article of manufacture embodying a program of instructions executable by a machine, the program of instructions including instructions for:

capturing video images and processing those images to isolate a human form from a background;

isolating the arm portions of the human form;

calculating the arm position and movement data; and

generating a signal responsive to the arm position and movement data for effecting translational and/or rotational movement of an object on a graphical display.

19. The article of manufacture of claim 18 wherein the signal generated by the program of instructions is used to generate the state of a flight simulator graphical display.

20. An article of manufacture embodying a program of instructions executable by a machine, the program of instructions including instructions for:

capturing video images with the device and using the image processor to process those images to isolate a human form from a background;

isolating the arm portions of the human form from a captured video image using the image processor;

calculating the arm position and movement data using the image processor; and

generating a signal responsive to the arm position and movement data using the image processor.

21. An article of manufacture embodying a program of instructions executable by a machine, the program of instructions including instructions for:

capturing, from the video sequence, a frame that does not include a person;

isolating a view (foreground/subject image) by performing an algorithm on the video sequence and the frame that does not include a person; {entire? partial?}

determining whether the isolated view includes the image of a person;

determining the horizontal extent of the subject's torso so as to isolate the arm portions of the human form in a/the/each captured video frame;

computing the arm angles by calculating angles of principle moment of the nonzero pixels in the arm portions of the video image; and

generating an arm position/movement data signal responsive to arm angles for effecting the translational and/or rotational movement of an object on a graphical display.

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